

Pistosaurus

Pistosaurus (“saurus” in Greek meaning “reptile” and “lizard”) is an extinct genus of aquatic sauropterygian reptile closely related to plesiosaurs. Fossils have been found in France and Germany, and date to the Middle Triassic. It contains a single species, ***Pistosaurus longaevus***. *Pistosaurus* is known as the oldest “subaquatic flying” reptile on earth.

The skull of *Pistosaurus* is generally resembles that of other Triassic sauropterygians. However, there are several synapomorphies that make *Pistosaurus* distinguished: the long, slender, snout; the possession of splint-like nasals that are excluded from the external naris; and the posterior extension of the premaxilla to the frontals.^[1] Based on synapomorphies such as the small nasals size and the presence of interpterygoid vacuity, *Pistosaurus* is more closely related to Plesiosauria than to Nothosaurus.^[1]

Pistosaurus is often mistaken with *Nothosaurus* and Plesiosauria. *Nothosaurus* belongs to the clade Nothosauroida from the middle Triassic (approximately 199-251 million years ago); while *Pistosaurus* belongs to stem group Plesiosauria; and both *Pistosaurus* and Plesiosauria belongs to clade Pistosauroida from Triassic. Both Nothosauroida and Pistosauroida belong to Sauropterygia.^[1]

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Description and paleobiology

Pistosaurus was about 3 metres (10 ft) long, and had a body form resembling that of nothosaurs, aquatic reptiles that flourished during the Triassic. However, the vertebral column was stiff, like that of a plesiosaur, implying that the animal used its paddle-like flippers to propel itself through the water, as the plesiosaurs probably did. The head also resembled that of a plesiosaur, but with the primitive palate of a nothosaur, and

Pistosaurus

Temporal range: Middle Triassic, Anisian–Ladinian

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Fossil

Scientific classification 

Kingdom:	Animalia
Phylum:	Chordata
Class:	Reptilia
Superorder:	†Sauropterygia
Family:	†Pistosauridae Zittel, 1887
Genus:	† <i>Pistosaurus</i> Meyer, 1839

Type species

†***Pistosaurus longaevus***
Meyer, 1839

numerous, sharp teeth ideal for catching and eating fish.^[2]



Restoration of *Pistosaurus longaevus*

Post-cranial skeleton

The description below is based on the specimen examined by paleontologist Sues in 1987.

Pectoral girdle and forelimbs

The structure of pectoral girdle and humerus are used to support the anterior part of the body.^[3] The scapula in pectoral girdle of *Pistosaurus* consists with a massive body and a short posterodorsal process. It is smaller in size compared to coracoid. And its lateral margin of the body is gently convex anteroposteriorly while the medial margin is more strongly convex.^[3]

The coracoid bone of *Pistosaurus* is flat and expanded medially.^[3] The glenoid region is similar to *Nothosaurus* in development: both the slight notching of its margin and a distinct facet contact with the humeral head. There is also a ridge like thickening which links the glenoid to posteromedial region of the coracoid.^[3] This feature is a synapomorphy that appears in plesiosaurs, which is a thickened ridge passes transversely across the anterior portion of the coracoid to connect the glenoid region. This feature is suggested related to compressional force by limb motion in *Pistosaurus*.^[3]

A specimen of the left humerus of *Pistosaurus* analyzed by Paleontologist A.R.I. Cruickshank is one of the largest specimens recorded: 245mm long and 45mm wide at the mid-shaft.^[4] The specimen showing that the axis of *Pistosaurus*' humerus is straight, with the distal end slightly expanded posteriorly.^[4] From proximal view, the head of the humerus is concave, which is a sign of a substantial cap of cartilage at the head of humerus. The humerus of *Pistosaurus* also lacks entepicondylar foramen.^[4]

Pistosaurus has a strongly flattened **ulna**. It has medium length and nearly symmetrical in dorsal view.^[3] Its anterior margin is more curved and thicker than the posterior one. This feature broads the wide spatium interosseum enclosed between radius and ulna.^[3] The proximal end of radius is less expanded than that of ulna, while the distal end is less expanded than proximal one but thickened.^[3] The anterior margin is nearly straight while the posterior margin is more curved compared to the anterior one. Like other sauropterygians, the radius of *Pistosaurus* is slightly longer than the ulna.^[3]

Pelvic girdle

The pelvic girdle of *Pistosaurus* is more similar to primitive sauropterygians than to plesiosaurs.

The ilium of *Pistosaurus* has an iliac blade, which has almost parallel anterior and posterior margins.^[3] Same as other non-plesiosaur sauropterygians, the ilium in *Pistosaurus* contacts both the pubis and the ischium, forming a ring-like structure. The ilium from *Pistosaurus* is relatively large in size compared to *Nothosaurus*, whose ilia did not appear to have any elongated blade.^[3]

The femur of *Pistosaurus* is longer than its humerus. Its anterior margin is almost straight whereas the posterior margin is concave.^[3] According to the specimen provided by paleontologist Sues, the proximal articular end is much more robust than the distal one, and is more or less triangular in transverse section.^[3]

Classification

Although it is unlikely that *Pistosaurus* was a direct ancestor of the plesiosaurs, the mixture of features suggests that it was closely related to that group.^[2]

The following cladogram follows an analysis by Ketchum & Benson, 2011.^[5]



Limb bone

The classification for Plesiosauria was difficult at the first place. The anatomy of stem group Sauropterygia has very primitive synapomorphies such as dermal palate. Initially, Plesiosauria were suggested related to Pistosauroida, which belongs to Eusauropterygia from Triassic. Three genera of Plesiosauria was known in the history: *Corosaurus alvocensis*, *Cymatosaurus*, and *Pistosaurus longaevus*.^[6] A later discovery of a new Pistosauridea from middle triassic of Nevada by paleontologist Sander indicates that *Augustasaurus* is closely related to *Pistosaurus*, while there are several difference including axial skeleton.^[7]

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